

Dimensionally Stable Structural Space Cable, Phase II

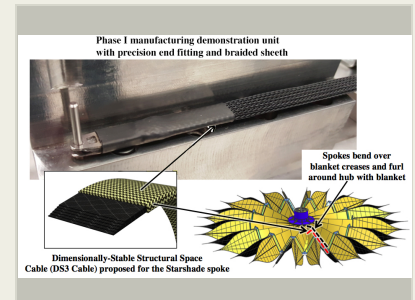
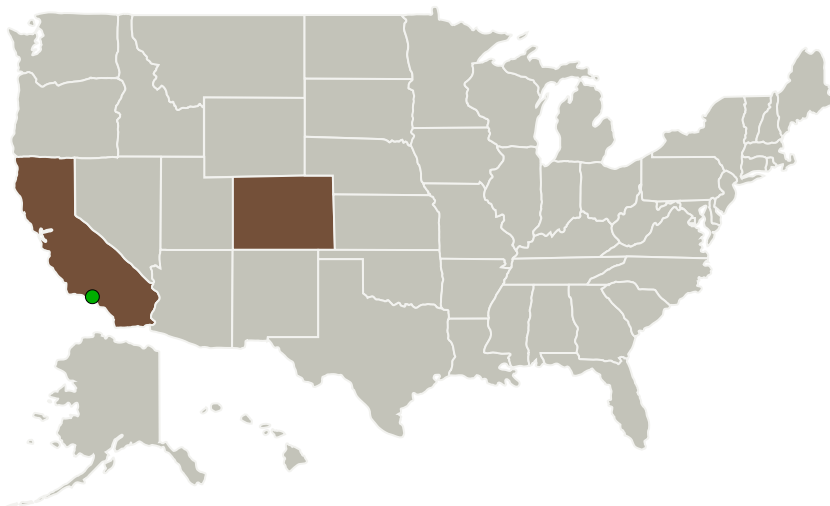
Completed Technology Project (2016 - 2019)



Project Introduction

Jet Propulsion Laboratory (JPL) is involved in an ongoing effort to design and demonstrate a full-scale (30-32m diameter) Starshade engineering demonstrator that meets the aggressive deployment dimensional repeatability and stability requirements for exoplanet detection. A key component of the Starshade structural system is a series of dimensionally stable composite cables (or spokes) that connect the center structural hub to the perimeter truss and largely determine the deployed shape and stiffness of the system much like a bicycle wheel. There are many challenges in developing the Starshade spoke. Perhaps most notable is that meeting the CTE requirement necessitates accurate control of fiber volume fraction (resin content) to less than 1%. Also challenging is that meeting the stiffness precision goal of less than 0.5% variation between cables demands that minimal fiber fraying and damage be allowed during the tow spreading and alignment process and that the net cross section be made in one step with no required post-processing. Furthermore, meeting the length precision goal requires uncommon assembly and end fitting bonding methodologies. Finally, there are challenges associated with integrating such high-performance cables into the Starshade while ensuring snag-free deployment and proper on-orbit operation. The DS3 Cable technology addresses all of these challenges with a highly tailorable thermoplastic-tape design that uses Dual Resin Bonding technology for strength and dimensional stability at the end fittings.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Roccor, LLC	Lead Organization	Industry	Longmont, Colorado
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

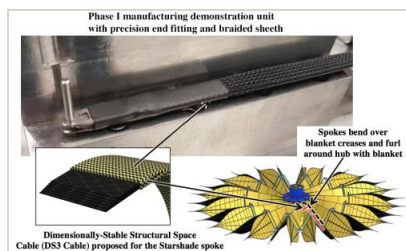
California	Colorado
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Project Transitions

**May 2016:** Project Start**October 2019:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/139582>)

Images

**Briefing Chart Image**

Dimensionally Stable Structural Space Cable, Phase II
(<https://techport.nasa.gov/image/135984>)

**Final Summary Chart Image**

Dimensionally Stable Structural Space Cable, Phase II
(<https://techport.nasa.gov/image/135798>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Roccor, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Dana Turse

Co-Investigator:

Thomas Murphey

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Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.2 Structures
 - └ TX12.2.1 Lightweight Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System